DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TE1CH
Revision 9
Allison
AE 2100A
AE 2100C
AE 2100D3

January 25, 1999

TYPE CERTIFICATE DATA SHEET NO. TE1CH

Engine models described herein conforming with this data sheet (which is part of Type Certificate No. TE1CH) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certified aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations provided they are installed, operated, and maintained as prescribed by the manufacturer's FAA approved manuals and other FAA approved instructions.

Type Certificate Holder: Allison Engine Company, Inc.
Indianapolis, Indiana 46206-0420

Models AE 2100A, AE 2100C, and AE 2100D3

Type: Free turbine turboprop engine, modular design, 14 stage axial compressor, annular combustor, 2 stage gas generator turbine, 2 stage power turbine, front mounted propeller reduction gearbox, bottom mounted power section accessory gearbox, two single channel full authority digital electronic controls.

Model	AE 2100A		AE 2100C	
Ratings (see Note 1)	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
Takeoff (5 min,):				
Shaft Horsepower, SHP	4,152	- -	3,271	- -
Gas Generator Speed, rpm	15,030	- -	14,847	- -
Output Shaft Speed, rpm	1,100	- -	1,100	- -
Measured Gas Temperature °F	1,417	- -	1,365	- -
Maximum Continuous:				
Shaft Horsepower, SHP	3,738	- -	3,271	- -
Gas Generator Speed, rpm	14,873	- -	14,847	- -
Output Shaft Speed, rpm	1,100	- -	1,100	- -
Measured Gas Temperature, °F	1,371	- -	1,365	- -
Output Shaft Gear Ratio:	13.98:1	- -	13.98:1	- -
Propeller Mount:	Flange type	- -	- -	- -
Principal Dimensions of Basic Engine:				
Length (overall), in.	115.68	118.14	115.68	- -
Width (max), in.	31.40	32.84	31.40	31.92
Height (max), in.	49.62	52.92	49.62	52.72
C. G. location, dry				
• aft of prop flange, in.	52.36	54.04	52.36	51.92
• above engine center line, in.	2.15	2.50	2.15	2.40
Weight (dry), lb:	1,578	1,610	1,578	- -

"- -" indicates "same as previous model"

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Model (cont'd)	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
Engine Control System: (major components)	Lucas Aerospace full authority digital electronic control (FADEC), qty 2.	- -	Lucas Aerospace full authority digital electronic control (FADEC), qty 2.	- -
	Lucas Aerospace fuel pump & metering unit (FPMU)	- -	Lucas Aerospace fuel pump & metering unit (FPMU)	- -
	Lucas Aerospace compressor variable geometry (CVG) actuator.	- -	Lucas Aerospace compressor variable geometry (CVG) actuator.	- -
Fuels:	Kerosene, commercial turbine fuel conforming to: MIL-T-5624, Grade JP-5 or MIL-T-83133, Grade JP-8 or ASTM D1655, Jet A/A-1.	Kerosene, commercial turbine fuel conforming to: MIL-T-5624, Grade JP-4 and JP-5 or MIL-T-83133, Grade JP-8 or ASTM D1655, Jet A/A-1 and Jet B.	Kerosene, commercial turbine fuel conforming to: MIL-T-5624, Grade JP-5 or MIL-T-83133, Grade JP-8 or ASTM D1655, Jet A/A-1.	- -
Lubrication Oil:	Synthetic oil conforming to MIL-L-23699D or MIL-PRF-7808L Grade III	- -	Synthetic oil conforming to MIL-L-23699D or MIL-PRF-7808L Grade III	- -
Ignition System:	Simmonds Precision Products, Inc. dual capacitance discharge, high energy type exciters, dual igniter plugs	- -	Simmonds Precision Products, Inc. dual capacitance discharge, high energy type exciters, dual igniter plugs	- -
Certification Basis:	14 CFR Part 33 dated February 1, 1965, with Amendments 1 through 14 inclusive and 14 CFR Part 34.	- -	14 CFR Part 33 dated February 1, 1965, with Amendments 1 through 14 inclusive and 14 CFR Part 34.	- -
	Original application for Type Certificate dated February 15, 1990 amended July 20, 1992. Type certificate No. TE1CH, issued April 23, 1993.	Major design change approved April 15, 1994. (See Note 13)	Original application for Type Certificate dated June 15, 1992, amended July 20, 1992 and December 17, 1993. Type certification No. TE1CH amended December 20, 1993.	Major design change approved August 11, 1994. (See Note 13)
Production Basis:	Production Certificate No. 310, dated June 24, 1993.	- -	- -	- -

"- -" indicates "same as previous model"

Model	AE 2100D3
Ratings (see Note 1)	(P/N 23054062)
Takeoff (5 min, see Note 1):	
Shaft Horsepower, SHP	4,637
Gas Generator Speed, rpm	15,113
Output Shaft Speed, rpm	1,020.7
Measured Gas Temperature °F	1,490
Maximum Continuous:	
Shaft Horsepower, SHP	4637
Gas Generator Speed, rpm	14,874
Output Shaft Speed, rpm	1,020.7
Measured Gas Temperature, °F	1,433
Output Shaft Gear Ratio:	13.98:1
Propeller Mount:	- -
Principal Dimensions of Basic Engine:	
Length (overall), in.	124.12
Width (max), in.	28.71
Height (max), in.	46.33
C. G. location, dry	
• aft of prop flange, in.	59.66
• above engine center line, in.	2.97
Weight (dry), lb:	1,641

	AE 2100D3 (P/N 23054062)
Engine Control System: (major components)	Lucas Aerospace full authority digital electronic control (FADEC), qty 2. Lucas Aerospace fuel pump & metering unit (FPMU) Lucas Aerospace compressor variable geometry (CVG) actuator.
Fuels:	Kerosene, commercial turbine fuel conforming to: MIL-T-5624, Grade JP-4 and JP-5 or MIL-T-83133, Grade JP-8 or ASTM D1655, Jet A/A-1 and Jet B.
Lubrication Oil:	Synthetic oil conforming to MIL-L-23699D or MIL-PRF-7808L Grade III
Ignition System:	Simmonds Precision Products, Inc. dual capacitance discharge, high energy type exciters, dual igniter plugs
Certification Basis:	14 CFR Part 33 dated February 1, 1965, with Amendments 1 through 15 inclusive and 14 CFR Part 34. Original application for type Certificate dated September 15, 1994 amended under Allison letter 96-AY-094.
Production Basis:	- -

"- -" indicates "same as previous model"

NOTE 1.
Engine ratings are based on:

- Sea level static, 29.92" Hg, (ISA +39°F for AE 2100A), (ISA +54°F for AE 2100C), (ISA +44°F for AE 2100D3).
- Flat rated to 98°F (AE 2100A), 113°F (AE 2100C), 103°F (AE 2100D3), compressor inlet temperature
- 100% inlet pressure recovery
- Exhaust nozzle area (A9) of: AE 2100A= 220 in^2, AE 2100C= 220 in^2, AE 2100D3= 235 in^2 .
- Zero relative humidity
- No inlet air distortion
- No customer bleed extraction
- No external power extraction
- No anti-ice airflow
- Fuel having an LHV of 18400 Btu/lb (AE 2100A), 18550 Btu/lb (AE 2100C), and 18300 Btu/lb (AE 2100D3), otherwise conforming to fuels specified for use with this engine.
- Oil conforming to MIL-L-23699.
- Minimum Specification Engine (100%)

NOTE 2.

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
Temperature Limits:				
Measured Gas Temp. (same as T4.5 and ITT)				
Takeoff (5 minutes)	1566°F	- -	1528°F	- -
Max. Continuous	1532°F	- -	1528°F	- -
Starting	1500°F	- -	- -	- -
Oil Inlet Temperature:				
Max. Steady State	185°F	190°F	185°F	- -
Max. Transient (5 min.)	200°F	- -	200°F	- -
Minimum	-40°F (MIL-L-23699D)	- -	-40°F (MIL-L-23699D)	- -
	-65°F (MIL-PRF-7808L Grade III)	- -	-65°F (MIL-PRF-7808L Grade III)	- -
External Engine Component Maximum Temperatures: The maximum component operating temperatures are listed in the engine Installation Design Manual, CSP 34003 for the AE 2100A (P/N 23053610), CSP 34006 for the AE 2100A (P/N 23060202), and CSP 34031 for the AE 2100C (P/N 23057466 and P/N 23060302).				
Fuel Pump Inlet Temp.:				
Minimum	-65°F, or that temp. corresponding to 12 centistokes (Cs) fuel viscosity, whichever is higher.	- -	-65°F, or that temp. corresponding to 12 centistokes (Cs) fuel viscosity, whichever is higher.	- -
Maximum steady state	135°F	- -	135°F	- -

"- -" indicates "same as previous model"

NOTE 2. (cont'd)

Model	AE 2100D3 (P/N 23054062)
Temperature Limits:	
Measured Gas Temp. (same as T4.5 and ITT)	
Takeoff (5 minutes)	1566°F
Max. Continuous	1532°F
Starting	- -
Oil Inlet Temperature:	
Max. Steady State	185°F
Max. Transient (5 min.)	200°F
Minimum	-40°F (MIL-L-23699D) -65°F (MIL-PRF-7808L Grade III)

External Engine Component Maximum Temperatures:
The maximum component operating temperatures are listed in the engine Installation Design Manual, CSP 34040 for the AE 2100D3 (P/ N 23054062).

Fuel Pump Inlet Temp.:	
Minimum	-65°F, or that temp. corresponding to 12 centistokes (Cs) fuel viscosity, whichever is higher.
Maximum steady state	135°F

NOTE 3.

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
Maximum Permissible Speeds:				
Gas Generator:				
Steady State, rpm	15,404	- -	15,404	- -
Transient, rpm	15,558	- -	15,558	- -
Power Turbine:				
Steady State, rpm	15,375	- -	15,375	- -
Transient, rpm	16,298	- -	16,298	- -
Prop Shaft:				
Steady State, rpm	1,100	- -	1,100	- -
Transient, rpm	1,166	- -	1,166	- -

Model	AE 2100D3 (P/N 23054062)
Maximum Permissible Speeds:	
Gas Generator:	
Steady State, rpm	15,404
Transient, rpm	15,558
Power Turbine:	
Steady State, rpm	14,267
Transient, rpm	15,480
Prop Shaft:	
Steady State, rpm	1,020.7
Transient, rpm	1,107

"- -" indicates "same as previous model"

NOTE 4.

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
Maximum Permissible Engine Shaft Torque:				
Transient, ft lb	1,710	- -	1,710	- -
Takeoff (5 min), ft lb	1,470	- -	1,168	- -
Max. Continuous, ft lb	1,328	- -	1,168	- -

Model	AE 2100D3
	(P/N 23054062)
Maximum Permissible Engine Shaft Torque:	
Transient, ft lb	1,933
Takeoff (5 min), ft lb	1,732
Max. Continuous, ft lb	1,732

NOTE 5.

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
Pressure Limits:				
Oil Pressure Limits:				
Power Section (max), psig	80	90[a]	80	- -
Power Section (min), psig	40	- -	40	- -
Prop gearbox (max), psig	210[b]	- -	210[b]	- -
Prop gearbox (min), psig	25	20	25	- -
Fuel Pump Inlet Pressure:				
Minimum	Fuel true vapor pressure (TVP) plus 3 psi.	For Jet-A fuel true vapor pressure (TVP) plus 3 psi. For Jet-B fuel true vapor pressure (TVP) plus 11.4 psi	Fuel true vapor pressure (TVP) plus 3 psi .	- -
Maximum, psig	52	- -	52	- -

Note a.) Power section oil pressure is 90 psig if Service Bulletin AE 2100A-79-045 has been complied with, otherwise limit remains at 80 psig.
Note b.) Power section and gearbox pressures may reach 250 psig for up to 2.5 minutes during initial starting and warm-up.

"- -" indicates "same as previous model"

Model	AE 2100D3
	(P/N 23054062)
Pressure Limits:	
Oil Pressure Limits:	
Power Section (max), psig	80
Power Section (min), psig	40
Prop gearbox (max), psig	210[(b)]
Prop gearbox (min), psig	15
Fuel Pump Inlet Pressure:	
Minimum	For Jet-A fuel true vapor pressure (TVP) plus 3 psi. For Jet-B fuel true vapor pressure (TVP) plus 11.4 psi
Maximum, psig	52

Note b.) Power section and gearbox pressures may reach 250 psig for up to 2.5 minutes during initial starting and warm-up.

NOTE 6.
Accessory Drive Provisions:

Model	AE 2100A and AE 2100C				
Accessory	Direction of rotation	Speed ratio	Max torque cont. (in. lb)	Max torque static (in. lb)	Max overhung moment (in. lb)
		Power Section Accessory Gearbox			
Starter	CW	1.0000	1080	3240	80
		Gearbox Mounted Accessory Drive Gearbox			
Generator	CW	1.1258	373	2100	250
Pitch Control Unit	No drive provided (mounted pad only)	N/A	N/A	N/A	100
Prop oil pump	CCW	0.3506	120	500	40
Hydraulic pump	CW	0.5942	125	450	100
		Oil Tank			
Feather pump	No drive provided (mount pad only)	N/A	N/A	N/A	19

Accessory Drive Provisions:

Model	AE 2100D3				
Accessory	Direction of rotation	Speed ratio	Max torque cont. (in. lb)	Max torque static (in. lb)	Max overhung moment (in. lb)
		Power Section Accessory Gearbox			
Starter	CW	1.0000	1080	3240	80

"- -" indicates "same as previous model"

		Gearbox Mounted Accessory Drive Gearbox			
Generator	CW	0.8432	370	3000	600
Pitch Control Unit	No drive provided (mounted pad only)	N/A	N/A	N/A	100
Prop oil pump	CCW	0.3833	120	500	40
Hydraulic pump	CW	0.2571	344	1500	40

i) The feather pump is an aircraft supplied component.

ii) The AE 2100D3 oil tank is an aircraft supplied component.

NOTE 7.
The maximum permissible customer compressor bleed air quantity for all AE 2100A, AE 2100C, and AE 2100D3 engines as a percentage of the total engine inlet airflow is:

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
8th stage, %	3.7	N/A	3.7	N/A
10th stage, %	N/A	4.75	N/A	4.75
14th stage, %	8.0	9.2	8.0	9.2

Model	AE 2100D3
	(P/N 23054062)
8th stage, %	N/A
10th stage, %	8.0
14th stage, %	15.0

NOTE 8.
Mandatory replacement times (life limits) established for critical components and mandatory airworthiness inspections for the AE 2100A, AE 2100C and AE 2100D3 engines are published in Chapter 5, "TIME LIMITS/MAINTENANCE CHECKS" of the noted Engine Maintenance Manuals:

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
	CSP 31000	CSP 31005	CSP 31003	CSP 31003

Model	AE 2100D3
	(P/N 23054062)
	CSP 31004

"- -" indicates "same as previous model"

NOTE 9.
Approved Propellers:

Propellers to be used with this engine must have mounting provisions and functioning characteristics which are compatible with the engine and its control system. The AE 2100A, AE 2100C, and AE 2100D3 engines and control systems have been designed and tested to be compatible with the propellers models as noted:

Model	AE 2100A		AE 2100C	
	(P/N 23053610)	(P/N 23060202)	(P/N 23057466)	(P/N 23060302)
	Dowty R381	Dowty R381	Dowty R384	Dowty R384

Model	AE 2100D3
	(P/N 23054062)
	Dowty R391

The propeller models noted above are controlled by an integrated control system which is a part of the corresponding engine type design. The propeller models noted, comply with the propeller airworthiness requirements when used with the corresponding engine only. Any change to the engine, including its control system, which affects, or may affect, the propeller approval must be substantiated to demonstrate that the propeller as integrated with the changed engine, including its control system, still complies with the propeller certification basis. Also, any change to the engine, resulting from a change to the propeller, must be substantiated to demonstrate that the changed engine still complies with the engine certification basis.

The engine-propeller installation must be approved as a part of aircraft type certification.

NOTE 10.
Aircraft mounted engine control equipment consists of Qty. 2 FADEC units for the AE 2100A, AE 2100C, and AE 2100D3 engines.

NOTE 11.
For the AE 2100A and AE 2100C models, in actual field service, an engine cycle is defined as any flight consisting of one takeoff and landing, regardless of length of flight. Each touch-and-go is also considered an additional cycle.

For the AE 2100D3 model, in actual field service, an engine cycle is defined as any engine start to an idle condition.

AE 2100A and AE 2100C Low Cycle Fatigue (LCF) lives are based on an assumed worst case flight cycle, which includes engine start, a 3 second acceleration to a takeoff power of 3738 PSHP, 14,824 rpm NG, sea level 95°F day conditions and a 3 second deceleration to shutdown. Actual service mission usage must be monitored to ensure that the engine is operated within the assumed LCF mission. If actual service proves to be more severe than the LCF mission, rotor lives must be adjusted accordingly.

AE 2100D3 Low Cycle Fatigue (LCF) lives are based on an assumed C-130J aircraft mission profiles, which include three defined segments: a logistics mission, a combat training mission, and a proficiency training mission. These missions represent a combined series of touch and go's, full stop landings, and simulated air drops. Actual service mission usage must be monitored to ensure that the engine is operated within the assumed LCF mission. If actual service proves to be more severe than the LCF mission, rotor lives must be adjusted accordingly.

NOTE 12.
Automatic or manual FADEC transfer of control can cause a 6 percent engine power change for up to 5 seconds for the AE 2100A (P/N 23053610), and AE 2100C engines (P/N 23057466 and P/N 23060302).

"- -" indicates "same as previous model"

NOTE 13.
Model Description

The AE 2100 engines are based on the T406-AD-400 core engine from the Navy V-22 Osprey tilt rotor aircraft.

AE 2100A, P/N 23053610 (Base Model): Basic model; has bleed air off-take from the 8th and 14th stages.

AE 2100A, P/N 23060202: Same as AE 2100A, P/N 23053610 , except for having bleed air off-take from the 10th and 14th compressor stages, different engine control software, and other associated and unassociated changes. AE 2100A engines, P/N 23053610, S/N CAE510008 to S/N CAE510024 inclusive, are eligible to be converted to engine P/N 23060202 via Service Bulletin No. AE 2100A-72-037.

AE 2100C, P/N 23057466: Similar to the AE 2100A engine (P/N 23053610); rated at a maximum power of 3,271 shp.

AE 2100C, P/N 23060302: Similar to the AE 2100A engine (P/N 23060202) in that it incorporates bleed air off-take from the 10th and 14th compressor stages. The AE 2100C engine P/N 23060302 is a variant of engine P/N 23057466 and is also rated at a maximum power of 3271 shp.

AE 2100D3: Similar to the AE 2100A engine (P/N 23060202); rated at a maximum power of 4637 shp.

Initial production AE 2100A engines S/N's CAE 510001 through CAE 510034, and AE 2100C engines S/N's CAE 530001 and CAE 530002, are identified as GMA 2100A and GMA 2100C respectively and are different in model prefix only. The manufacturer of initial production AE 2100A engines CAE 510001 through CAE 510038, and AE 2100C engines CAE 530001 and CAE 530002, as identified on the engine data plates, is Allison Gas Turbine Division of General Motors. Subsequent engines have been manufactured by Allison Engine Company. The two manufacturers are different in name only.

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